

Patent Claims

1. Axial piston micropump having a cylinder drum, in which several cylinders are provided, and a swash plate, with respect to which the cylinder drum is rotatable, characterized in that at least two cylinders (41, 42) are provided, of which at least one is in the form of a working cylinder (41) which has an associated working piston (3), whilst at least one other cylinder is in the form of a balance cylinder (42) and has an associated balance piston (4).
2. Axial piston micropump according to claim 1, characterized in that only one cylinder is in the form of a working cylinder (41).
3. Axial piston micropump according to claim 1 or 2, characterized in that the working piston (3) is surrounded in the region of its end remote from the swash plate (1) by a resilient ring (10, 27, 51), which is arranged between working piston (3) and cylinder drum (2) and follows movement of the working piston (3).
4. Axial piston micropump according to claim 3, characterized in that the resilient ring (10, 51) is arranged between cylinder drum (2) and valve plate (8).
5. Axial piston micropump according to one of claims 1 to 4, characterized in that each cylinder (41, 42) is surrounded in the region of its end face adjacent to the valve plate (8) by a resilient ring (10, 51) which is arranged between cylinder drum (2) and valve plate (8).

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6. Axial piston micropump according to claim 3 or 4, characterized in that the ring (51) has a radially inner annular sealing flange (53) and a radially outer annular supporting flange (52) which is arranged substantially concentrically with respect to the sealing flange (53) and is joined to this by way of an annular web (54) of reduced thickness.
7. Axial piston micropump according to claim 6, characterized in that the sealing flange (53) has a smaller thickness than the supporting flange (52).
8. Axial piston micropump according to one of claims 3 to 7, characterized in that the ring (10, 27) is located in a circumferential groove (22).
9. Axial piston micropump according to one of claims 1 to 8, characterized in that the cylinder drum (2) has a through bore for each cylinder (41, 42) and on the side remote from the swash plate (1) is connected, without permitting relative rotation, to a valve plate (8, 25) which has an opening (11) only for each working cylinder (41).
10. Axial piston micropump according to claim 9, characterized in that each working cylinder (41) has a working chamber (21) in which the working piston (3) and its end face (23) move, the working chamber (21) being formed in the valve plate.
11. Axial piston micropump according to claim 9 or 10, characterized in that the opening (11) in the valve plate (8) has a constant diameter over the thickness of the valve plate (8).

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12. Axial piston micropump according to one of claims 1 to 11, characterized in that the valve plate (25) bears against a control plate unit (9) which is arranged non-rotatably in a housing (26), the control plate unit (9) being supported by way of an elastomeric bearing (28) on the housing (26).

13. Axial piston micropump according to one of claims 1 to 12, characterized in that the valve plate (8, 25) and/or the control plate unit (9) are made from ceramic material.

14. Axial piston micropump according to one of claims 1 to 13, characterized in that the cylinder drum (2) is driven by a stepper motor (7).

15. Axial piston micropump according to one of claims 1 to 14, characterized in that its displacement per revolution is less than 10 μ l.

16. Axial piston micropump according to one of claims 1 to 15, characterized in that the pistons (3, 4) are provided with bias springs (5) of substantially equal strength.